



Fact Sheet

US Army Engineer
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Waterways Experiment Station

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Ground-Penetrating Radar (GPR)

Purpose: To describe the use of ground-penetrating radar (GPR) for pavement evaluations.

Background: GPR is a system that has been used on a limited basis since 1986 to nondestructively measure the thickness of pavement structures. Most of the efforts were reasonably accurate (within 1/4 in.), but costs were prohibitive because vast amounts of data collected during the survey had to be processed to generate a usable product. With improvements in computer technology during the past five years, these costs have been reduced to a reasonable level. Current systems are contained in a van size truck that travels at 5 to 40 miles per hour while collecting data. As the data are collected in a traffic lane, distances are measured and marked for a reference system. Output is furnished the user in report form to include location and thicknesses of the surface and base course materials and the location and depth of utilities.

Facts: GPR has the potential to determine layer thicknesses, locate bedrock, and locate sewer and water lines buried to depths of approximately 4 ft. A major advantage of this system is that data can be collected at near highway speeds with minimal disruption of traffic resulting in minimal traffic congestion and safety problems. The US Army Engineer Waterways Experiment Station (WES) is fully equipped with two GPR systems and staffed to operate the units for nondestructive pavement evaluations. The GPR system utilizes three air-coupled transceiver units and one ground-coupled unit. The air-coupled units consist of 250-, 500-, and 1000-MHz antennas, and the ground-coupled unit is a 100-MHz antenna. The air-coupled units can be operated at highway speeds. The ground-coupled unit has to operate at a very slow speed. Specifications for the GPR system called for accurate thicknesses within the top 3 ft of surface and the detection of bedrock within 20 ft of the surface. From the air-coupled units, layer thicknesses can be obtained down to approximately 6 ft, with the highest frequency antenna giving the best reflections for the near surface layers. The ground-coupled unit allows penetrations of up to 20 ft for identification of bedrock layers. The GPR system can monitor data from all antennas continuously and link the data to a distance measuring instrument. Layer thicknesses are computed using post processing software and can be quickly evaluated with color graphic plots or tabular listings of calculated layer thicknesses. The system involves very specialized equipment, testing routines, and training for operations.



GPR Test Van

Point of Contact: For more information, contact Mr. Don Alexander at (601) 634-2731 or e-mail at alexand@wes.army.mil. General information on WES is available on the web site at

<http://www.wes.army.mil>.